MATERIALS USED IN A MOTOR VEHICLE PRODUCT Grinding, buffing, polishing ABRASIVES Engine parts, transmission parts, spark plugs, castings, trim mouldings Babitt for bearings, solder ANTIMONY Brake linings, gaskets, sound deadeners Filler for paints, rubber, plastics BARITE Ore for metal aluminum BAUXITE Wire insulation, adhesive, lubricant BEESWAX BISMUTH Hardens lead, tin, steel BORAX For smelting and special steel Alloy to harden copper, electroplating, paints CADMIUM Rubber making, paints, electrodes, graphite seals, CARBON electrical brushes Glue, glycerine, hides, hair for air cleaners CHEMICALS Nylon, synthetic rubber, plastics Ore produces chromium used for plating, alloys CHROMITE Sand binder in foundry, rubber filler, modelling COAL Iron and steel making, nylon, solvents, tars, fuel COBALT Steel making COCONUT OIL Paints, lacquers Stainless steel COLUMBIUM Electrical system, radiator, plated parts, alloys CORK Gaskets, insulation Wadding, padding, felt, tires, insulation, thread

DIAMONDS

FLUORSPAR

FLAXSEED

GOLD GOLD

IRON ORE

LIMESTONE

PAINT

PETROLEUM

PLASTICS

PLATINUM

SOY BEANS

SUGAR CANE

SULPHUR

TURPENTINE

VANADIUM -

ZIRCONIUM

Cutting, grinding, drilling metals

Flux in iron and steel making

Windshield, windows, headlights, insulation (spun)

Steel, castings for engine and chassis parts, paint

Flux in steel making, lubricant in wire making

Cellulose for safety glass, packing cases, paper,

Mirrors, amalgams with other metals, switches

Alloyed with steel, copper, other metals, plating

Gasoline, oil, lubricants, synthetics, solvents, as-

Alloy for special wire, electric contact points,

May be natural or synthetic. Tires, weather proofing, vibration damping, belting, insulation, hoses,

Frame, body, wheels, engine parts, gears, springs

Alcohol, cellulose for safety glass, solvent i

Vulcanizing rubber, lubricant, additives, steel

PETROLEUM

Fuels and Lubricants

OLUMES of refined petroleum products

are consumed by the auto industry.

From wells far below the earth's surface

comes the raw "crude" that is distilled in

great refineries for use as gasoline fuel,

oil, lubricants, synthetic rubber, solvents,

The average passenger automobile uses 687 gallons of gasoline in a single year.

To meet the demand for motor fuels, oil

companies constantly bore into the earth's crust in every corner of the world. Many

areas of the United States and Canada

and as a road-surfacing agent.

Insulation, gaskets, sound proofing, filters

Body and engine parts, trim, upholstery

Electrical system, plating, brazing

Linseed oil for paint

Ornament plating

Upholstery, belting

Fabric, floor coverings

Iron making

MAGNESIUM Light alloys for engine parts

MANGANESE Steel making

Batteries, gasoline, solder, plating

fibre board, truck body parts

Mineral ore of magnesium

Electrical insulators

Upholstery, carpets

Body and interior finish

MOLYBDENUM Steel alloys, fine wire, grease, paint

phalt products

windshield wipers

Seat padding

Alkyd paints

Upholstery, lining, tires

Plating, alloys, solder

Special steel

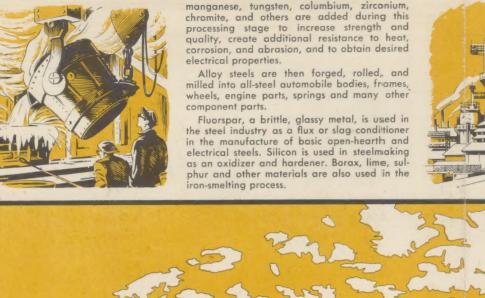
WHEAT STRAW | Straw board, panels

Special steel, lamp filaments

Upholstery, carpeting, felt

Batteries, alloy for die cast parts, plating

Alloy in steel and copper making, aluminum



produce great amounts of oil. Offshore

drilling operations have recovered addi-

tional supplies. Venezuela's Lake Mara-

caibo, the Persian Gulf area, and Indonesia

Carbon black, an oil industry product, is an ingredient of automotive paints. The rubber industry finds additional use for

carbon black in strengthening and pro-

longing the wear of automobile tires.

Asphalt products, such as sealing and

material, are derived from petroleum. Oil is also a basis for plastic products.

throughout the country supply petroleum

products to American motorists.

ementing agents and sound-deadening

More than 200,000 service stations

IRON AND STEEL

Sinews of Industry

THE automobile industry is the largest con-

sumer of iron and steel products in the

Inited States. More than 3,500 pounds of steel

are used to build the average passenger car. More than 100 varieties of steel alloys are used

At the nation's great steel centers—Pitts-

aw iron oxides, together with alloy metals ob-

burgh, Birmingham, and the Chicago area-

tained from mines the world over, are charged

nto great roaring furnaces that reduce the min-

Carbon, nickel, vanadium, molybdenum.

OTHER METALS Quantities of metals, other than those used in structural steels, are essential materials in au-tomobile manufacture. These minerals, among others, include copper, zinc, lead, tin, mercury, mica, and aluminum. Copper, in its native state and alloyed with other materials, is used extensively in ignition and lighting systems. Seven miles of wiring are used in the electrical parts of a modern auto-Zinc, together with copper, forms the brass or radiator parts. Zinc products are also used in batteries and metal plating. Lead is used primarily in storage batteries. Tin serves in the metal plating process and in



For Elasticity and Wear

A ORE than half-a-million tons of rub-

VI ber, or latex, are tapped from the

trees of the great Far Eastern rubber

ortation industry.

plantations each year for use in the trans-

Skilled workers of Indonesia, Malaya,

eylon, and Indo-China drain the milky

iquid from rubber trees after delicately

Crude rubber, together with nylon and

other materials, finds its greatest use in

automobile tires. Insulation, weather strip-

ping, floor mats, gaskets, are other uses

cutting the bark in an exacting manner.







CHEMISTRY

Research for Progress

IGH octane fuels, lubricating oils, synthet

Skilled chemists, together with metallurgists,

pply more than 250 chemical products used

today's automobiles; nearly 25 billion

ands of chemical materials are consumed in

Chromium, nickel, copper, tin, zinc, and

other metals are electroplated by chemical

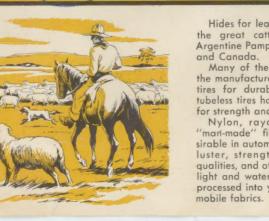
processes to improve corrosion resistance and to

ducing a year's volume of cars.

produce hard-wearing surfaces.

ics, and mineral alloys are a few of the

contributions to the auto industry.



Hides for leather upholstery come from the great cattle herds that roam the Argentine Pampas, Western United States, Many of the textile fibers are used in the manufacture of pneumatic automobile tires for durability and strength. New tubeless tires have a rugged fibrous layer for strength and safety. Nylon, rayon, and vinyl, so-called "man-made" fibers, are particularly desirable in automotive textiles. They possess uster, strength, exceptional wearing

qualities, and offer good resistance to sun light and water. The materials are easily processed into yarn and woven into auto-

RADIATOR

INSULATION WIRES

(Cotton, Beeswax, Copper)

More than 10 pounds of plastic materials, made from a variety of vegetable and mineral Steering wheels, reflectors, knobs, extruded bushings are a few of the uses of automotive Quantities of durable plastic-covered fabrics are utilized in automotive interiors. Foamed plastics are especially suited for seat cushion making. An invisible layer of vinyl plastic is used in safety glass.

Plastic materials find additional use in automotive dies and tools. Research indicates even more extensive use of plastics for cars of the

PLASTICS

PAINTS AND LACQUERS The automobile industry is a principal user of paints and lacquers, consuming approxi-mately 24 million gallons of the product yearly.

Paints are also used as a rust preventive.

ents used in automotive paints.

Barite, carbon black, coconut oil, flaxseed, cybeans, and turpentine are among the ingre-Modern paints are "weather-tested" under extreme conditions and subjected to technical

(Steel, Steel alloys)

UPHOLSTERY

(Cotton, Wool, Sisal,

Jute; Nylon, Rayon,

Leather, Plastics)

CARBURETOR

(Lead, Zinc, Antimony,

(Natural and synthetic

rubber, Textiles)

hemical tests to insure durable finishes and gh lusters for automotive interiors and exteors. These high-quality paints are mechanically sprayed and baked on automobile bodies n successive layers: drying time has been reduced from twenty days to less than an hour.



in mirrors. Mica is used chiefly as an electrical

Aluminum, the lightweight metal obtained

from bauxite ores mined principally in Surinam and Jamaica, and alloyed with other metals, is

used in generator, distributor, and carburetor

parts, cylinder heads, pistons, and bearings.

Approximately 30 pounds of aluminum are

platinum also are used in modern automobiles:

sses; platinum in electrical resistance units.

electrical systems and metal plating pro-

Industrial diamonds are used to cut, grind,

Precious minerals, such as gold, silver, and

used in the average automobile.